

BS EN ISO 4892-3:2016



BSI Standards Publication

Plastics — Methods of exposure to laboratory light sources

Part 3: Fluorescent UV lamps

bsi.

...making excellence a habit.
AVA Documents™
Document Sharing Hub

National foreword

This British Standard is the UK implementation of EN ISO 4892-3:2016. It supersedes BS EN ISO 4892-3:2013 which is withdrawn.

The UK participation in its preparation was entrusted to Technical Committee PRI/21, Testing of plastics.

A list of organizations represented on this committee can be obtained on request to its secretary.

This publication does not purport to include all the necessary provisions of a contract. Users are responsible for its correct application.

© The British Standards Institution 2016.
Published by BSI Standards Limited 2016

ISBN 978 0 580 88549 5

ICS 83.080.01

Compliance with a British Standard cannot confer immunity from legal obligations.

This British Standard was published under the authority of the Standards Policy and Strategy Committee on 31 March 2016.

Amendments/corrigenda issued since publication

Date	Text affected
------	---------------

English Version

Plastics - Methods of exposure to laboratory light sources - Part 3: Fluorescent UV lamps (ISO 4892-3:2016)

Plastiques - Méthodes d'exposition à des sources
lumineuses de laboratoire - Partie 3: Lampes
fluorescentes UV (ISO 4892-3:2016)

Kunststoffe - Künstliches Bestrahlen oder Bewittern in
Geräten - Teil 3: UV-Leuchtstofflampen (ISO 4892-
3:2016)

This European Standard was approved by CEN on 23 January 2016.

CEN members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration. Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the CEN-CENELEC Management Centre or to any CEN member.

This European Standard exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CEN member into its own language and notified to the CEN-CENELEC Management Centre has the same status as the official versions.

CEN members are the national standards bodies of Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, Former Yugoslav Republic of Macedonia, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and United Kingdom.



EUROPEAN COMMITTEE FOR STANDARDIZATION
COMITÉ EUROPÉEN DE NORMALISATION
EUROPÄISCHES KOMITEE FÜR NORMUNG

CEN-CENELEC Management Centre: Avenue Marnix 17, B-1000 Brussels

European foreword

This document (EN ISO 4892-3:2016) has been prepared by Technical Committee ISO/TC 61 “Plastics” in collaboration with Technical Committee CEN/TC 249 “Plastics” the secretariat of which is held by NBN.

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by September 2016, and conflicting national standards shall be withdrawn at the latest by September 2016.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CEN [and/or CENELEC] shall not be held responsible for identifying any or all such patent rights.

This document supersedes EN ISO 4892-3:2013.

According to the CEN-CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, Former Yugoslav Republic of Macedonia, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and the United Kingdom.

Endorsement notice

The text of ISO 4892-3:2016 has been approved by CEN as EN ISO 4892-3:2016 without any modification.

Contents

Page

Foreword	iv
1 Scope	1
2 Normative references	1
3 Principle	1
4 Apparatus	2
4.1 Laboratory light source	2
4.2 Test chamber	5
4.3 Radiometer	5
4.4 Black-panel/black-standard thermometer	5
4.5 Wetting	6
4.5.1 General	6
4.5.2 Spray and condensation system	6
4.6 Specimen holders	6
4.7 Apparatus to assess changes in properties	6
5 Test specimens	6
6 Test conditions	7
6.1 Radiation	7
6.2 Temperature	7
6.3 Condensation and spray cycles	7
6.4 Cycles with dark periods	7
6.5 Sets of exposure conditions	7
7 Procedure	8
7.1 General	8
7.2 Mounting the test specimens	8
7.3 Exposure	8
7.4 Measurement of radiant exposure	9
7.5 Determination of changes in properties after exposure	9
8 Exposure report	9
Annex A (informative) Relative irradiance of typical fluorescent UV lamps	10
Bibliography	16

Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights. Details of any patent rights identified during the development of the document will be in the Introduction and/or on the ISO list of patent declarations received (see www.iso.org/patents).

Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

For an explanation on the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the WTO principles in the Technical Barriers to Trade (TBT) see the following URL: [Foreword - Supplementary information](#)

The committee responsible for this document is ISO/TC 61, *Plastics*, Subcommittee SC 6, *Ageing, chemical and environmental resistance*.

This fourth edition cancels and replaces the third edition (ISO 4892-3:2013), of which it constitutes a minor revision with the following change:

— in [A.2.3](#), further information on lamp combination is added.

ISO 4892 consists of the following parts, under the general title *Plastics — Methods of exposure to laboratory light sources*:

- *Part 1: General guidance*
- *Part 2: Xenon-arc lamps*
- *Part 3: Fluorescent UV lamps*
- *Part 4: Open-flame carbon-arc lamps*

Plastics — Methods of exposure to laboratory light sources —

Part 3: Fluorescent UV lamps

1 Scope

This part of ISO 4892 specifies methods for exposing specimens to fluorescent UV radiation, heat and water in apparatus designed to simulate the weathering effects that occur when materials are exposed in actual end-use environments to global solar radiation, or to solar radiation through window glass.

The specimens are exposed to fluorescent UV lamps under controlled environmental conditions (temperature, humidity and/or water). Different types of fluorescent UV lamp can be used to meet all the requirements for testing different materials.

Specimen preparation and evaluation of the results are covered in other International Standards for specific materials.

General guidance is given in ISO 4892-1.

NOTE Fluorescent UV lamp exposures for paints, varnishes and other coatings are described in ISO 11507.

2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 4582, *Plastics — Determination of changes in colour and variations in properties after exposure to daylight under glass, natural weathering or laboratory light sources*

ISO 4892-1, *Plastics — Methods of exposure to laboratory light sources — Part 1: General guidance*

3 Principle

3.1 Fluorescent UV lamps, when following the manufacturer's recommendations for lamp maintenance and/or rotation, may be used to simulate the spectral irradiance of global solar radiation in the short wavelength ultraviolet (UV) region of the spectrum.

3.2 Specimens are exposed to various levels of UV radiation, heat and moisture (see [3.4](#)) under controlled environmental conditions.

3.3 The exposure conditions may be varied by selection of the following:

- a) type of fluorescent UV lamp;
- b) irradiance level;
- c) temperature during the UV exposure;
- d) type of wetting (see [3.4](#));

- e) wetting temperature and cycle;
- f) timing of the UV/dark cycle.

3.4 Wetting is usually produced by condensation of water vapour on to the exposed specimen surface or by spraying the test specimens with demineralized/deionized water.

3.5 The procedure(s) may include measurement of the irradiance and the radiant exposure in the plane of the specimen.

3.6 It is recommended that a similar material of known performance (a control) be exposed simultaneously with the test specimens to provide a standard for comparative purposes.

3.7 Intercomparison of results obtained from specimens exposed in different types of apparatus or to different types of lamp should not be made unless an appropriate statistical relationship has been established between the different types of equipment for the material to be tested.

4 Apparatus

4.1 Laboratory light source

4.1.1 Fluorescent UV lamps are fluorescent lamps in which radiant emission in the ultraviolet region of the spectrum, i.e. below 400 nm, makes up at least 80 % of the total light output. There are three types of fluorescent UV lamp used in this part of ISO 4892.

- **UVA-340 (type 1A) fluorescent UV lamp:** these lamps have a radiant emission below 300 nm of less than 1 % of the total light output, have an emission peak at 343 nm, and are more commonly identified as UVA-340 for simulation of global solar radiation from 300 nm to 340 nm (see [Table 1](#)). [Figure A.1](#) is a graph of spectral irradiance from 250 nm to 400 nm of a typical UVA-340 (type 1A) fluorescent lamp compared to global solar radiation.
- **UVA-351 (type 1B) fluorescent UV lamp:** these lamps have a radiant emission below 310 nm of less than 1 % of the total light output, have a peak emission at 353 nm, and are more commonly identified as UVA-351 for simulation of the UV portion of solar radiation behind window glass (see [Table 2](#)). [Figure A.2](#) is a graph of spectral irradiance from 250 nm to 400 nm of a typical UVA-351 (type 1B) fluorescent UV lamp compared to global solar radiation filtered by window glass.
- **UVB-313 (type 2) fluorescent UV lamp:** these lamps are more commonly identified as UVB-313 and have a radiant emission below 300 nm that is more than 10 % of the total output and a peak emission at 313 nm (see [Table 3](#)). [Figure A.3](#) is a graph of the spectral irradiance from 250 nm to 400 nm of two typical UVB-313 (type 2) fluorescent lamps compared to global solar radiation. UVB-313 (type 2) lamps may be used only by agreement between the parties concerned. Such agreement shall be stated in the test report.
- **Four different UV lamps used as one combination:** these four different UV lamps are used together as one combination with a suited filter. See [Figure A.4](#) in [A.2.3](#).

NOTE 1 UVB-313 (type 2) lamps have a spectral distribution of radiation, which peaks near the 313 nm mercury line and can emit radiation down to $\lambda = 254$ nm, which can initiate ageing processes that never occur in end-use environments.

NOTE 2 The solar spectral irradiance for a number of different atmospheric conditions is described in CIE Publication No. 85. The benchmark global solar radiation used in this part of ISO 4892 is from CIE Publication No. 85:1989, Table 4.

4.1.2 Unless otherwise specified, UVA-340 (type 1A) fluorescent UV lamps shall be used to simulate the UV part of global solar radiation (see [Table 4](#), method A). Unless otherwise specified, UVA-351 (type 1B)